

Catalogue of American Amphibians and Reptiles.

McDiarmid, R.W. and R.J.R. McLeary. 1993. *Phyllorhynchus*.

***Phyllorhynchus* Stejneger**
Leaf-nosed Snakes

Phimothyra: Cope, 1868:310 (part).

Phymothyra: Garman, 1884a:39 (part).

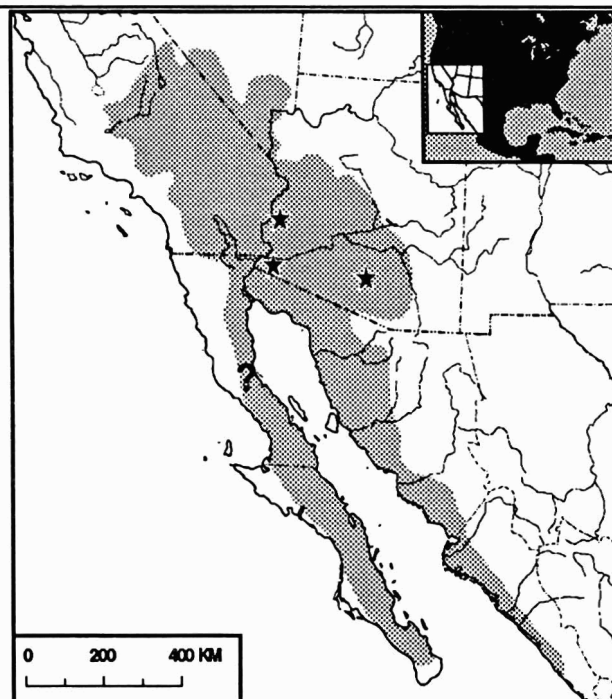
Salvadora: Garman, 1884a:39 (part).

Phyllorhynchus Stejneger, 1890:151. Type-species, *Phyllorhynchus browni* Stejneger, 1890, by original designation.

Lytorhynchus: Boulenger, 1893:414 (part).



Figure 1. Photograph of the male holotype of *Phyllorhynchus browni* (USNM 15719).



Map. Distribution of the genus *Phyllorhynchus*. Fossil sites are indicated by stars. The question mark indicates a hiatus in the range in northern Baja California (see Distribution).

• **Content.** Two species are recognized: *browni* (four subspecies: *browni*, *fortitus*, *klauberi*, and *lucidus*) and *decurtatus* (five subspecies: *decurtatus*, *arenicola*, *norrisi*, *nubilus*, and *perkinsi*).

• **Definition and Diagnosis.** This genus of colubrid snakes is characterized by small size (140-510 mm total length, see comments on maximum size), and a large rostral plate which is produced backward to separate entirely the internasals. The head is slightly

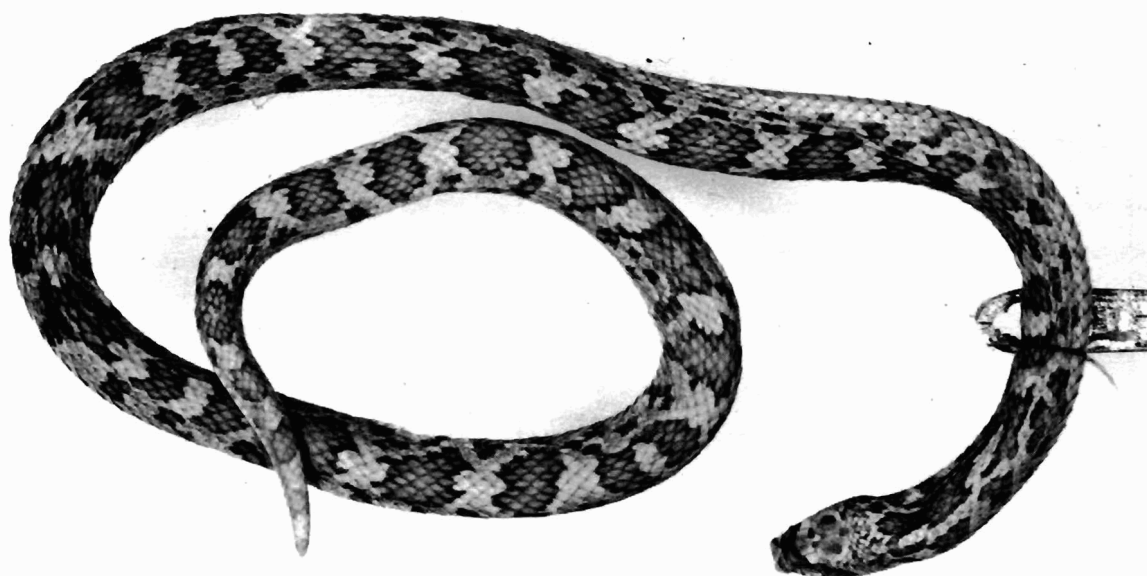


Figure 2. Photograph of the female holotype of *Phyllorhynchus decurtatus* (ANSP 5489).

distinct from the neck. Tail-body length ratios vary from 10.8-23.1% in males and 7.8-11.2% in females. The eye is large, with a vertically elliptical pupil, and the ocular ring is composed of 5-10 scales. Most scale characters of the head are highly variable: supralabials usually 6 or 7, sometimes 5, 8 or 9; infralabials usually 8 or 9, sometimes 7, 10 or 11; temporals 5-12; loreals 1-9; and suboculars 1-6. Chin shields are in 1-2 pairs. Nasals are divided. Dorsal scale rows usually are 21-19-17, but variation reported at all three positions; midbody rows typically are 19. Ventral scales number 148-187 in males, 158-196 in females. Subcaudals are paired and number 19-42 in males and 18-34 in females. The cloacal scute is entire.

Blotches are present on the dorsum: in *P. browni* body blotches number 10-18 and tail blotches 2-4; in *P. decurtatus* body blotches are 18-60 and tail blotches 2-9. Lateral spots are present in most *P. decurtatus* and may be present in *P. browni*. A dark band passes between the eyes and posterolaterally to the angle of the mouth in *P. decurtatus*. The band in *P. browni* often is irregular in shape and extent. The dorsal ground color ranges from cream, yellow, or pink to beige, pale brown, or pale gray. Dorsal blotches, lateral spots, and eye band all range from pale or creamy brown to dark chocolate brown. Blotches are usually darker on the borders and paler in the center. A few blotches in some *P. browni* are hourglass-shaped and may represent a precursor to two blotches.

• **Descriptions.** Stejneger's original description of *Phyllorhynchus* appeared in 1890, even though the species *P.*

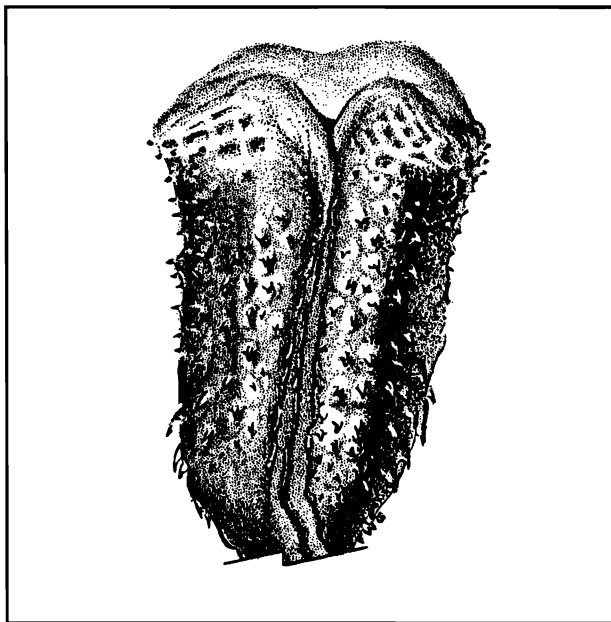


Figure 3. Drawing of the hemipenis of *Phyllorhynchus browni* based on AMNH 92892 (courtesy of Herndon G. Dowling).

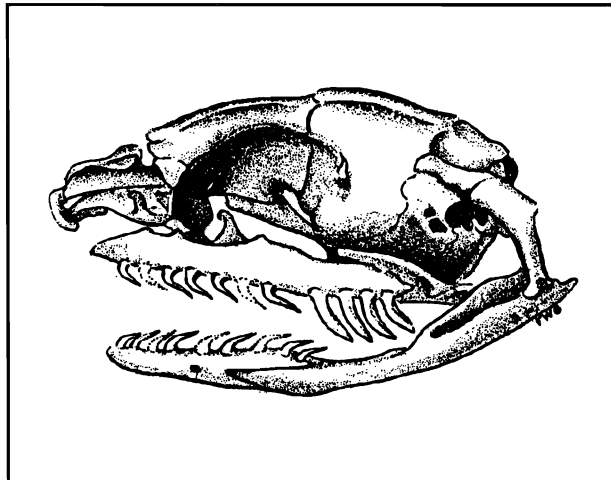


Figure 4. Drawing of the skull of *Phyllorhynchus decurtatus* based on AMNH 68614 (courtesy of Herndon G. Dowling).

decurtatus was described by Cope in 1868 under the genus *Pbimothyrus*. At the time, Cope's concept of *Pbimothyrus* included three species of the genus *Salvadora* Baird and Girard. Detailed descriptions of both species are in works by Cope (1900), Van Denburgh (1922), Klauber (1935, 1940), Bogert and Oliver (1945), and Wright and Wright (1957). Other descriptions were presented by Cope (1892), Boulenger (1893), Brown (1901), Ditmars (1907, 1939, 1951), Hensley (1950), Smith and Hensley (1958), Cagle (1957), Hardy and McDiarmid (1969), Leviton (1971), Marx and Rabb (1972), Shaw and Campbell (1974), Obst et al. (1988), and Yingling (1991). Both species are treated in field guides and similar works by Schmidt and Davis (1941), Stebbins (1954, 1966, 1985), Lowe (1964), Fowlie (1965), Cochran and Goin (1970), and Behler and King (1979). Descriptions of specimens of *P. browni* were given by Vorhies (1926), Duellman (1955), Zweifel and Norris (1955), and Shannon and Humphrey (1959). Descriptions of specimens of *P. decurtatus* are in Garman (1884a), Atsatt (1921), Van Denburgh and Slevin (1921), Schmidt (1922), Klauber (1924, 1932, 1934), Medden (1927), Linsdale (1932, 1933), Taylor (1936), Pickwell (1947), Smith and Langebartel (1951), Cliff (1954a, 1954b), Savage and Cliff (1954), Murray (1955), Leviton and Banta (1964), McCoy (1964), Miller and Stebbins (1964), Tanner (1969), Bostic (1971), Stebbins (1972), Powers and Banta (1974), and Campbell and Christman (1982).

• **Illustrations.** Drawings of species of *Phyllorhynchus* can be found in Stejneger (1890, *P. browni*), Cope (1900, both), Schmidt and Davis (1941, *P. decurtatus*), Stebbins (1954, 1966, 1985, both; 1972, *P. decurtatus*), Simon (1979, both), Smith and Brodie (1982, both) and Obst et al. (1988, *P. browni*). A skull of *Phyllorhynchus* spp. was illustrated in Dowling and Duellman (1974-1978), and a hemipenis in Dowling (1975) and Dowling and Duellman (1974-1978). Black and white photographs of *Phyllorhynchus browni* are in Bogert and Oliver (1945) and Cochran and Goin (1970); of *P. decurtatus* in Bogert (1939), Ditmars (1939), Pickwell (1947), Miller and Stebbins (1964), and Powers and Banta (1974); of both species in Klauber (1935, 1940), Wright and Wright (1957), Fowlie (1965), and Yingling (1991). Color photographs are in Schmidt and Inger (1957, *P. browni*), Shaw and Campbell (1974, both), Behler and King (1979, both), Obst et al. (1988, *P. browni*), and Coborn (1991, both). A photograph of hemipenes is in Klauber (1935). A photograph of tracks made by *P. decurtatus* in sand is in Cowles (1941). The visual cells of the same species were illustrated in Underwood (1967).

• **Distribution.** Species of *Phyllorhynchus* are found in dry, desert environments from Inyo County, California, southern Nevada, and southcentral Arizona in the north to the tip of Baja California and Mazatlán, Sinaloa, México in the south. Specimens also have been collected on islands in the Gulf of California, including Angel de la Guarda, Cerralvo, Monserrate, San José, and San Marcos. Most collection records have come from specimens that were found on roads. Klauber (1935) noted that until collecting by automobile at night became popular, Leaf-nosed Snakes were considered rare. Distributional gaps in some parts of the range of both species may reflect a lack of roads and hence easy access for collectors. Absence of records from areas with roads may reflect inadequate sampling or unsuitable habitat (some areas of Arizona and Sonora).

• **Fossil Record.** Van Devender and Mead (1978) reported vertebrae from five Early Holocene packrat middens in Arizona. Most of the material was referred to *P. decurtatus* (although both species occur together in parts of the range).

• **Pertinent Literature.** Species of *Phyllorhynchus* were included in checklists and similar summary papers (other than as indicated above) by Cope (1875, 1887), Yarrow (1882), Garman (1884b), Belding (1887), Van Denburgh (1895), Van Denburgh and Slevin (1913), Stejneger and Barbour (1917, 1923, 1933, 1939, 1943), Cuesta Terrón (1920), Ortenburger and Ortenburger (1927), Klauber (1930), Slevin (1931, 1934), Cowles and Bogert (1936), Dice (1939), Kauffeld (1943), Smith and Taylor (1945), Wright and Wright (1952), Schmidt (1953), Conant et al. (1956), Cagle (1957), Gates (1957), Lindsay (1964), Banta (1965), Smith and Smith (1976), Murphy (1983), Collins et al. (1978, 1982), Collins (1990), and Banks et al. (1987). Species of *Phyllorhynchus* were included in keys by Blanchard (1925), Perkins (1940, 1949), Savage (1948, 1949), and Savage and Cliff (1954). Observations on *Phyllorhynchus* behavior were reported Atsatt (1923, locomotion, activity, stimuli response), Klauber (1931, 1939, activity), Cowles (1941, wintering habits), Brattstrom

(1953, activity and defense), and Greene (1988, antipredator mechanisms). Statistical treatments of character distributions were presented by Klauber (1941a, 1941b, 1943, 1945) and Kerfoot (1969, 1970). Effects of temperature on activity was discussed by Atsatt (1923), Bogert (1939), Cowles and Bogert (1944), Saint-Girons and Saint-Girons (1956), Spector (1956), and Lowe et al. (1971). Type specimens of *Phyllorhynchus* were listed by Peters (1952), Leviton and Banta (1956), Cochran (1961), Smith et al. (1964), Sloan (1965), and Kluge (1984). Weaver (1965) and Underwood (1967) mentioned a peculiar osteological trait in *P. decurtatus*. Romer (1956) included *Phyllorhynchus* in the Colubrinae based on osteological observations, and Van Devender and Mead (1978) described vertebral characters for the genus. The only record of albinism for the genus was reviewed by Hensley (1959). Klauber (1935) and Neill (1963) commented on specific differences in body pattern. Klauber (1943) demonstrated striking sexual dimorphism in a single population of *P. decurtatus*. Barbour (1926) commented on the adaptive nature of the snout, and Mosauer (1932) suggested that the shape of the nostril might be an adaptation to dwelling in sand. Savage and Cliff (1954) described the hemipenis of *P. d. arenicola*, and *Phyllorhynchus* was included in an analysis of scale microdermatoglyphics by Price (1982). Underwood (1967, 1970) gave information on the eye of *P. decurtatus*, and Miller (1968) and Baird (1970) included *Phyllorhynchus* in their studies of the reptile ear. Karyological information for *Phyllorhynchus decurtatus* (2N = 36) was presented by Bury et al. (1970), Trinco and Smith (1972), and Baker et al. (1972). Savage (1960) listed *Phyllorhynchus* as a member of the Young Northern Element and included the genus in his discussion of the evolution of the Baja California herpetofauna. Species of *Phyllorhynchus* are oviparous; clutch size and reproductive season were discussed by Brattstrom (1953), Stebbins (1954), and Fitch (1970). Ditmars (1912) speculated on food habits of Leaf-nosed Snakes, but the only verified prey items are lizards (*Coleonyx variegatus*, *Callisaurus draconoides*) and their eggs (Klauber, 1935; Brattstrom, 1953; Dial et al., 1989; Peter Thule and Harry W. Greene, pers. comm.). Remains of Hymenoptera reported by Brattstrom (1953) may have been ingested secondarily. No verifiable records of insects as prey are known (see Atsatt, 1923). The only known predators of Leaf-nosed Snakes are other snakes (Klauber, 1935; 1956). Vitt and Hulse (1973) reported that captive *Micruroides euryxanthus* refused specimens of both species. Dial et al. (1989) experimentally examined detection of *P. decurtatus* odor by *Coleonyx variegatus*.

• **Etymology.** The name *Phyllorhynchus* is neuter and is derived from the Greek *phyllon*, meaning leaf, and *rhynchos*, meaning nose or snout, in reference to the enlarged rostral shield that resembles an upturned leaf.

• **Key to Species.** The number in parentheses refers to the pertinent Catalogue account.

1. a. Dorsal pattern of 10-18 dark brown, often saddle-shaped, body blotches; 2-4 blotches on tail; lateral spots usually absent *Phyllorhynchus browni*
- b. Dorsal pattern of 18-60 middorsal, irregular brown blotches; 2-15 tail blotches; irregular lateral spots well developed *Phyllorhynchus decurtatus* (580)

• **Remarks.** Although *Phyllorhynchus* often is cited in geographical lists and field guides, not much is known about its biology. Important aspects of behavior, reproduction, foraging ecology, and food habits remain a mystery.

Wright and Wright (1957) indicated an incorrect maximum length of 1027 mm for *P. browni*. This error occurred as values for body lengths from Klauber's (1943) compilation were being copied. The length of 1027 mm applies to *Salvadora hexalepis virgulata*, the taxon immediately above *P. b. browni* in Klauber's Table 7.

Although several subspecies of *Phyllorhynchus browni* and *P. decurtatus* currently are recognized, we have doubts as to their evolutionary verity and taxonomic distinctiveness, and question the utility of recognizing certain of them. Most of these subspecies are based on perceived differences in pattern, coloration, ventral/subcaudal counts, and the degree of dorsal scale keeling. Broad overlap in these characters occurs between most subspecies and many of these traits vary geographically within subspecies. More research is needed to provide an understanding of how color and pattern vary geographically within each species. Data are available

to indicate that developmental temperature can influence the phenotypic expression of segmental number, e.g., ventral and subcaudal counts (Osgood, 1978) and may influence pattern and coloration as well (Vinegar 1974, Ross and Marzec, 1990). If, after detailed analysis, some populations are shown to be distinct and to have had a separate history, then recognition of subspecies or species may be justified. We believe, however, that after detailed study most of the currently recognized subspecies in each species will be shown to represent color and pattern ecomorphs and provide little toward elucidating the history of the taxa.

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